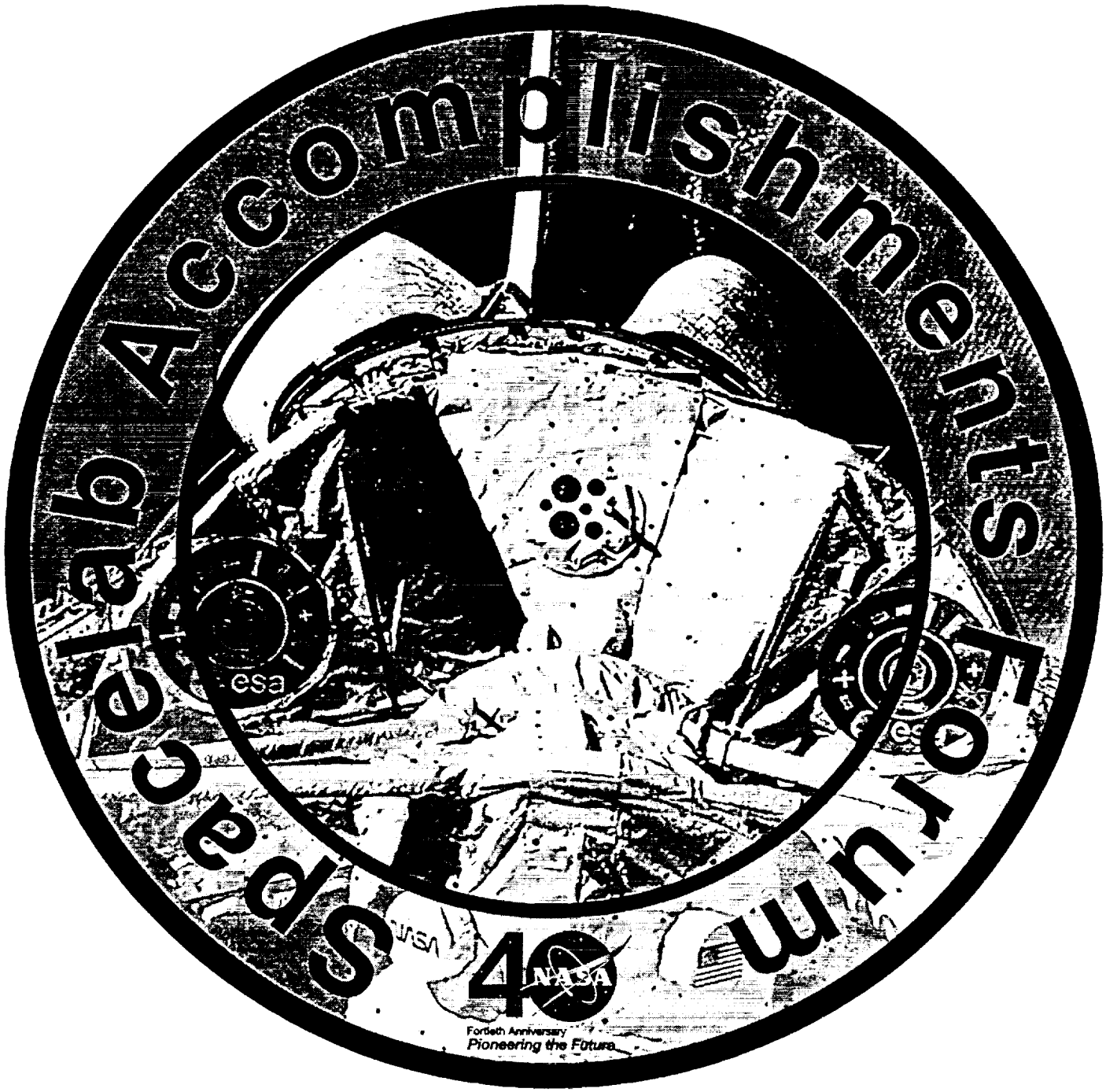

March 10–11, 1999

Spacelab

Spacelab-A Synopsis

The Spacelab Module, exposed platforms, and supporting instrumentation were designed and developed by the European Space Agency to house advanced experiments inside the Space Shuttle cargo bay. The Spacelab program has hosted a cross-disciplinary research agenda over a 17-year flight history. Several variations of Spacelab were used to host payloads for almost every space research discipline that NASA pursues-life sciences, microgravity research, space sciences, and earth observation studies. After seventeen years of flight, Spacelab modules, pallets, or variations thereof flew on the Shuttle 36 times for a total of 375 flight days.

The Spacelab suite of hardware included four principle components:

1. The Spacelab Module is a pressurized, cylindrical facility 23 feet long and 13 feet wide that attached to the Orbiter within the Shuttle cargo bay. Internal research facilities were modular in nature, altered on a flight-by-flight basis to address the particular research requirements of each Spacelab Module research mission. Sixteen module flights supported over 600 investigations in the life and physical sciences.

2. The Spacelab Pallet was designed by ESA and its industrial partners for large instruments requiring direct exposure to space or systems needing unobstructed, broad fields of view. The U-shaped pallets were 13 feet wide and 10 feet long and were capable of supporting up to 3 tons in payload. Up to five pallets could be flown at a time. Twelve Pallet flights supported almost 100 investigations in Technology, Space Science, Earth Science, and the Life and Microgravity Sciences.

3. The Instrument Pointing System (IPS) was designed by ESA to provide a minimum of 2 arc seconds of pointing accuracy for Spacelab Pallet-mounted payloads. Three research missions utilized the IPS system to generate high-quality scientific returns for astronomy and astrophysics payloads.

4. The Mission-Specific Experiment Support Structure (MPESS) was built in the United States and managed as an integral component of the Spacelab research program. MPESS pallets support up to 3000 pounds of payload and can provide power, thermal control, and data handling capability. Twelve Spacelab flights flew payloads mounted on the adaptable MPESS platforms to support a robust, cross-disciplinary research agenda.

Spacelab

Over almost two decades of flight, the Spacelab module and exposed platforms represented the most advanced Shuttle research facilities of their time. A Spacelab module was even flown to Mir to serve as a visiting laboratory during the 1st U.S.-Russian, Shuttle-Mir docking mission.

Research on Spacelab flights has been widely international. Scientific hardware contributors and Principle and Co-Investigators have participated from Australia, Belgium, Canada, France, Germany, India, Italy, Japan, Russia, Switzerland, the United Kingdom—and of course, the United States. Reflecting international leadership roles in the Spacelab program, Germany directed Spacelab payload operations for the Spacelab-D1 and D2 flights.

Spacelab research has been responsible for tremendous scientific and commercial research advances in life and microgravity space research. More than 750 Spacelab experiments resulted in over 1,000 refereed articles, 2,000 talks and abstracts, and 250 master's and doctoral theses. The Spacelab program has been one of the most successful space research programs in history.

Our experience with the Spacelab program has paved the way for research on the International Space Station. We have garnered important experience in multinational cooperation and data dissemination. We have learned to work together to improve research operations and results analysis. The international coordination required by Spacelab missions has been an excellent foundation for the high level of integration that is necessary for successful International Space Station research operations.

Moreover, we have garnered 17 years of experience conducting research in a laboratory environment 180 miles above the Earth in a crewed space vehicle. We have learned from our experience about what types of investigations work best in such an environment, and are applying that knowledge as we plan the initial stages of Station research.